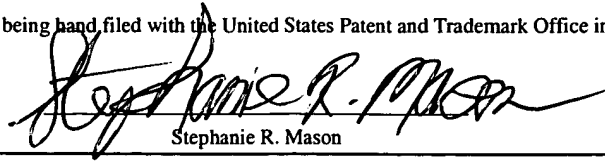




PATENT  
Docket No. 360842003400

**CERTIFICATE OF HAND DELIVERY**

I hereby certify that this correspondence is being hand filed with the United States Patent and Trademark Office in Washington, D.C. on September 16, 2003.

  
Stephanie R. Mason

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In the application of:

Akira NISHIMURA et al.

Serial No.: 09/079,468

Filing Date: May 15, 1998

For: CLOTH PREPREG AND WET  
PROCESS FOR MANUFACTURING  
THE SAME

Examiner: Christopher C. Pratt

Group Art Unit: 1771

**APPELLANT'S OPENING BRIEF**

Mail Stop AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This is a timely appeal from the final rejection of claims 22-28, 43 and 44 of this application.

**I. REAL PARTY IN INTEREST**

The real party in interest is Toray Industries, Inc.

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## **II. RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences within the meaning of 37 CFR 1.192(c)(2) known to Appellants or counsel.

## **III. STATUS OF CLAIMS**

Claims 22-28, 43 and 44 (shown in Appendix 1), which are under final rejection, are the only pending claims in the application.<sup>1</sup>

(a) Claim Rejections - 35 USC 103: Claims 22-28, 43 and 44 were rejected as being obvious over U.S. Pat. No. 5,447,785 (Kishi) in view of U.S. Pat. No. 5,100,713 (Homma).

## **IV. STATUS OF AMENDMENTS**

The Advisory Action of July 9, 2003 states that for the purposes of Appeal, the Amendment of June 16, 2003 will be entered.

## **V. SUMMARY OF THE INVENTION**

The invention of this application is generally directed to a cloth prepreg used for manufacturing fiber reinforced plastic (hereafter referred to as FRP) and a wet process for manufacturing the prepreg. [1:6-8]<sup>2</sup>

A manufacturing method of a flat yarn woven fabric having uniform fiber distribution and large cover factor, using thick reinforcing fiber thread is desirable and has been proposed in JP-A-07-300389. However, this method requires weaving

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<sup>1</sup> The Advisory Actions of May 29 and June 9, 2003 also include claim 40 as a pending claim. However, claim 40 was canceled without prejudice or disclaimer in the Amendment of May 15, 2003.

apparatus provided with a weft supply device to prevent twisting and a special apparatus to retain the flatness of the yarn. Furthermore, this woven fabric is unstable because the flatness of yarn is easily lost during the drying step employed when a wet process of manufacturing the prepreg (which is otherwise excellent in resin impregnation to the woven fabric) is employed. [1:29-2:6]

Also, the use of a low melting point polymer has been proposed to maintain the flatness of the yarns in the prepreg. However, the flatness could be lost during the wet process for manufacturing a prepreg, resulting in a mesh-like woven fabric with a narrow yarn. In particular, when the woven fabric enters the drying zone of the prepreg manufacturing process, the flatness is gradually lost. [2:7-14]

The present invention enables the manufacture of a cloth prepreg of a large cover factor which has uniform fiber distribution by a low cost wet process for manufacturing such a cloth prepreg. [2:15-18] The “cover factor” is a factor related to the openings in the woven fabric or the cloth prepreg in which only the resin fills the openings. If the area S1 is the area of the fabric or prepreg and S2 of the openings in the area S1, the value defined by the formula [6:18-23]:

$$\text{Cover factor, cf} = [(S1-S2)/S1] \times 100$$

An embodiment of this invention is a cloth prepreg comprising a woven fabric impregnated with a resin and having a binder distributed line-like on the fabric to maintain yarn flatness, which fabric has a number of crossing points of warp and weft in a range of from 2,000 to 70,000/m<sup>2</sup>, preferably 2,500 to 25,000/m<sup>2</sup>, a cover factor of at least 90%, warp and weft yarns substantially, free from twist and having a width of 3 to 20mm and a flatness as defined by a ratio of yarn width to yarn thickness of at least 20. [2:24-30]

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<sup>2</sup> The page and line numbers are those of the substitute specification submitted with the Preliminary Amendment of June 28, 2001.

In one embodiment, the cloth prepreg is made by a wet process as recited in the pending claims. One wet process for manufacturing a prepreg is illustrated in Figure 1 of the specification. In Figure 1, diluted resin 3 is placed in a resin bath 2 located beneath a vertically dispersed furnace 5. A rolled woven fabric 1 is dipped into the resin bath 2 to impregnate resin into the fibers of the woven fabric and then passed through the furnace to dry the fabric. [4:15-21]

During the prepreg manufacturing process hot air is blown at the woven fabric surface to dry the solvent [4:22-5:6] and the woven fabric is squeezed between rollers. [5-8-24]

As compared to a woven fabric using a carbon fiber yarn having about 3,000 (3K) filaments, which was commonly used prior to this invention, a woven fabric using a carbon fiber yarn having 6,000 (6K) to 24,000 (24K) filaments per yarn is more cost effective because the 6K to 24K yarn has two to eight times the cross sectional area of a 3K yarn. [7:12-18] Thus, for the same size of a woven fabric, fewer yarns of warp and weft are required for the 6K to 24K yarn as compared to a 3K yarn, and fewer yarns of warp and weft obviously result in fewer crossing points of the warp and weft. However, the Appellants unexpectedly found that the benefit of using the thicker 6K to 24K yarn as compared to a 3K yarn is accompanied with an unforeseen problem. The problem is that as “the number of crossing points of the warp and weft becomes few[er], ... [there is] slippage (or shifting) of the yarn in the woven fabric during the [wet] prepreg manufacturing process, resulting in degradation [i.e., low cover factor] of the prepreg.” [7:19-22]

The Appellants were the first to recognize the problem of the low cover factor of a woven cloth of a thick yarn, such as a 12K yarn, when it was subjected to a wet process and have

provided a solution by this invention, the results of which were totally unexpected. See Mr. Nishimura's Declaration of May 12, 2000. Furthermore, please note paragraph 6 of the Declaration of Mr. Nishimura of November 8, 2001, which states:

The 3K fabric of Kishi and its wet prepreg are shown in Photographs 1 and 2. Comparing the cover factors of the 3K fabric and its prepreg in Table 1 and Photographs 1 and 2, it is clear that the 3K fabric and its wet prepreg have almost the same "openings." Therefore, prior to this invention, a person of ordinary skill in this art did *not* even know or would have recognized that a problem of low cover factor in a wet prepreg could exist even though the woven fabric prior to prepegging has a high cover factor.

In order to solve this unforeseen problem of a low cover factor in prepregs having thick yarns for warps and wefts, the Appellants found that "if the fabric weave slips during the prepreg manufacturing process, the crossing point of the warp and weft should be fixed by a binder deposited so as to assume a line-like configuration." [7:23-25]

Prior to this invention, neither the problem of a low cover factor in prepregs having thick yarns for warps and wefts nor the solution of this invention were recognized by persons of ordinary skill in this art.

## **VI. ISSUES PRESENTED FOR REVIEW**

(1) Whether the Examiner erred in rejecting claims 22-28, 43 and 44 as being obvious over Kishi in view of Homma.

## **VII. GROUPING OF CLAIMS**

Group I: Claims 22-28, 43 and 44 stand or fall together. Claims 23-28, 43 and 44 directly or indirectly depend from claim 22.

## VIII. ARGUMENTS

### A. The Obvious Rejection of the Claims Over the Prior Art Should be Reversed.

Claims 22-28, 43 and 44 have been rejected as being obvious over Kishi in view of Homma. “[I]t is the examiner’s position that one having ordinary skill in the art would have found it obvious to add the binder of Homma with the fabric of Kishi.” See page 4, lines 1-3, of the Action of January 15, 2003. The Examiner recognizes that Kishi does *not* disclose a binder. *Id.* at page 3, lines 6 and 7. So, the Examiner resorts to Homma to complete any case of obviousness. However, there is no evidence in either Kishi or Homma of a motivation for persons of ordinary skill in the art to have used the “binder” disclosed in Homma in the fabrics of Kishi to produce the claimed prepregs. In fact, *nowhere* does Homma even use the word “binder.” This obviousness rejection fails because the Examiner has presented no evidence to support an essential element of the *prima facie* case of obviousness, that persons of ordinary skill in the art would have been motivated to combine the fabrics of Kishi with anything that could arguably construed as a “binder” of Homma to produce the inventions as claimed in the rejected claims.

“Obviousness is ultimately a question of law that rests on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) objective considerations of nonobviousness.” *Advanced Display Systems, Inc. v. Kent State University*, 212 F.3d 1272 (Fed. Cir. 2000).

To argue that the Examiner has failed to establish a *prima facie* case of obviousness, Appellants will first concentrate on the Examiner’s lack of understanding of the law on obviousness, particularly on motivation to combine references. Then, Appellants will discuss the “underlying factual inquiries” made by the Examiner, particularly regarding the scope and content of the prior art relied upon by the Examiner, and explain the inaccurate conclusions

drawn by the Examiner regarding what the prior art teaches to persons of ordinary skill in this art. Finally, Appellants will explain that the Examiner's obviousness rejection of claims 22-28, 43 and 44 over Kishi in view of Homma is based on *both* incorrect understanding of the law and inaccurate conclusions regarding what Homma teaches to persons of ordinary skill in this art.

The Examiner's understanding of the law on motivation to combine references is stated on page 3, line 9 to page 4, line 1 of the Action of January 15, 2003. The Examiner states that "there is no requirement that a motivation to make the modification be expressly articulated." *Id.* at page 3, lines 12 and 13. Furthermore, the Examiner cites *In re Bozek*, 163 USPQ 545 (CCPA 1969) and states, "References are evaluated by what they suggest to one versed in the art, *rather than by their specific disclosures*." [Emphasis added.] The Examiner's understanding is clearly incorrect in accordance with recent Federal Circuit cases such as *In re Lee*, 277 F.3d, 1338, 61 USPQ2d 1430 (Fed. Cir. 2002). *In re Lee* also overturns the proposition of *In re Bozek* on which the Examiner has relied upon to argue that "[r]eferences are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures."

Similarly, in *In re Lee*, the Board stated:

The conclusion of obviousness may be made from common knowledge and common sense of a person of ordinary skill in the art *without any specific hint or suggestion in a particular reference*. [Emphasis added.]

Both the Examiner in this case and the Board in *In re Lee* took the position that the USPTO does *not* have to provide any "specific" evidence or suggestion in a reference for motivation to combine references. In rejecting this position of the Board, the Federal Circuit in *In re Lee* states:

The case on which the Board relies for its departure from precedent, *In re Bozek*, 416 F.2d 1385, 163 USPQ 545 (CCPA 1969), indeed mentions "common knowledge and common sense," the CCPA stating that the phrase was used by the Solicitor to support the Board's conclusion of obviousness based on evidence in the prior art. *Bozek* did not hold that common knowledge and common sense are a substitute for evidence, but only that they may

be applied to analysis of the evidence. *Bozek* did not hold that objective analysis, proper authority, and reasoned findings can be omitted from Board decisions. Nor does *Bozek*, after thirty-two years of isolation, outweigh the dozens of rulings of the Federal Circuit and the Court of Customs and Patent Appeals that determination of patentability must be based on evidence. This court has remarked, in *Smiths Industries Medical Systems, Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1356, 51 USPQ2d 1415, 1421 (Fed. Cir. 1999), that *Bozek's* reference to common knowledge "does not in and of itself make it so" absent evidence of such knowledge.

The Examiner argues on page 4, lines 3-5 of the Action of January 1, 2003 that persons of ordinary skill in the art would have been motivated to use Homma's "binder" in Kishi's fabric because "[s]uch a combination would have been motivated by the reasoned expectation of reducing the twist in Kishi's yarns and maintaining long-term flatness." That argument begs the question of why persons of ordinary skill in this art would have been motivated to use Homma's "binder" in Kishi's fabric when Homma does not specifically state that the "binder" improves yarn flatness and Kishi does not even disclose a "binder," which the Examiner has acknowledged. The fact that there might be a "reasoned expectation" as stated by the Examiner that the yarns in Kishi's fabric and Homma's prepreg might have "flatness" is such a general motivation that it does not respond to the evidentiary burden which the Examiner must satisfy to make out a *prima facie* case. Such a motivation is so broad that it does not answer the central question of why, out of all the references disclosing "binders" -- and there must be thousands of such references -- would a person of ordinary skill in the art choose Homma as the disclosure to look to. The answer is apparent: Without applicant's disclosure and claims as a roadmap, *no* person of ordinary skill in this art would have chosen Homma's "binder" for use in Kishi's fabric. This is classic, impermissible hindsight.

The Examiner's selected motivation is so general in the context of the relevant art that it constitutes no more than the reference to a general level of skill in the art found deficient in *In re*



*Lee*, previously cited. As emphasized by the court in *In re Lee*, 61 USPQ2d at 1433, the Examiner must present specific evidence of motivation, not the generalized evidence relied on in the final Action of January 15, 2003:

When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. See, e.g., *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351-52, 60 USPQ2d 1001, 1008 (Fed. Cir. 2001) (“the central question is whether there is reason to combine [the] references,” a question of fact drawing on the *Graham* factors).

The burden imposed by *Lee* is not an impossible burden, as explained by the court in *In re Thrift*, 298 F.3d 1357, 1364-65, 63 USPQ2d 2002 (Fed. Cir. 2002), with respect to the references relied on by the Board in that case:

In the present case, the reasoning articulated by the Board is exactly the type of reasoning required by *In re Lee*. Both the examiner and the Board clearly identified a motivation to combine the references, stating that the skilled artisan would have “found it obvious to incorporate the speech input and speech recognition techniques taught by Schmandt into the expert system of Stefanopoulos in order to reduce the need for less user friendly manual keyboard and mouse click inputs.” Decision on Appeal at 5; accord Aug. 7, 1996 Office Action at 3. The motivation to combine the references is present in the text of each reference. The Schmandt reference itself verifies this motivation, stating that “allowing users to remain focused on the screen and keyboard, instead of fumbling for the mouse, would be beneficial in a workstation environment.” Schmandt at 51. Stefanopoulos itself, while not expressly disclosing the use of speech recognition, sets forth the motivation to combine the references, stating that “there are alternative means to select the buttons, including . . . voice-activated transfer means, which may be readily adapted for use with the present invention by those skilled in the art.” ’237 patent, col. 4, ll. 34-38.

The reliance in the Action of January 15, 2003 on the fact that there might be a “reasoned expectation” the yarns in Kishi’s fabric and Homma’s prepreg might both have “flatness” comes nowhere close to the analysis required by *Lee* and approved in *Thrift*.

The Examiner alleges that “Homma teaches a flattening operation involving a binder. Therefore, it would have been obvious to the skilled artisan to utilize *Homma’s flattening operation ...*.” See Action of August 7, 2002, page 3, paragraph 5, lines 9 and 10; emphasis added. Subsequently, on page 4, lines 7-9, in the Action of January 15, 2003, the Examiner alleges, “Homma teaches an extremely efficient and effective method to maintain yarn flatness while using minimal binder material, i.e., by lines.” When Appellants pressed the Examiner during prosecution for some teaching in Homma to support these positions, the Examiner cited column 6, lines 53-55 and column 5, lines 40-50 of Homma in the Advisory Action of May 29, 2003. Appellants respectfully submit the Board to examine what Homma actually discloses in column 6, lines 53-55 and column 5, lines 40-50, which are quoted below.

Column 6, lines 50-55 of Homma states:

In this method, since the impregnation ability of a matrix in the formation of a fiber reinforced composite material deteriorates if the reinforcing woven fabrics are bonded by surface bonding, bonding at points or bonding by lines is desirable.

Column 5, lines 38-50 of Homma states:

This fixing can be conducted in such a manner as disclosed in European Patent Publication 272,083, JP-A-SHO-61-34244 or Japanese Utility Model Publication SHO 61-198284, wherein a yarn composed of a thermoplastic [sic, thermoplastic] polymer having a low melting point such as nylon, copolymerized nylon, polyester, vinylidene chloride or vinyl chloride is supplied together with a warp yarn and/or a weft yarn when the warp yarn and the weft yarn are woven to a reinforcing woven fabric, and after the weaving, the thermoplastic [sic, thermoplastic] polymer yarn is molten and the warps and the wefts of the reinforcing woven fabric are bonded to each other at their intersections by the molten thermoplastic polymer.

Nowhere does Homma disclose a “flattening operation” or “flatness.” Thus, the Examiner’s statements that Homma discloses a “flattening operation” and “Homma teaches an

extremely efficient and effective method to maintain yarn flatness while using minimal binder material, i.e., by lines” are *not* supported by *any* evidence in Homma.

Homma’s disclosures in column 6, lines 53-55 and column 5, lines 40-50, which are relied upon by the Examiner for disclosing “efficient and effective method to maintain yarn flatness” is so general as to be tantamount to no real disclosure at all. That is all there is: there is no reference to “efficient and effective method to maintain yarn flatness” in Homma as asserted by the Examiner and certainly no suggestion in Homma to use any given “binder” for maintaining “yarn flatness.”

Based on *Lee* and *Thrift*, the appropriate question to ask again at this point in the analysis is: why, based on Kishi, would a person of ordinary skill in the art have had *any* reason to look at Homma and to use Homma’s disclosure in conjunction with Kishi to arrive at the claimed invention? There is only one reasonable answer: impermissible hindsight reliance on applicant’s disclosure and claims as a roadmap to choose Homma.<sup>3</sup> This failure to present evidence of motivation requires that the rejection be withdrawn.

In short, the Examiner has made two mistakes in the process of arriving at a conclusion of a *prima facie* case of obviousness. First, this determination of obviousness is based on an incorrect underlying factual inquiry regarding the scope and content of the prior art, namely Homma. Second, the Examiner has improperly applied the law on motivation to combine references. Thus, the Examiner has failed to establish a *prima facie* case of obviousness.

The Appellants respectfully submit that the Board should also consider the fact that the Appellants were the first to recognize a problem not known to persons of ordinary skill in this art

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<sup>3</sup> Applicant recognizes that an Examiner cannot search prior art to use in examining a patent application without reading the application and its claims first. That much “hindsight” is permissible and expected in the examination process. However, that is as far as hindsight in the examination process can go. Once the Examiner finds prior art that appears to be relevant based on the limited amount of hindsight that is permissible, *Lee* and *Thrift* require the Examiner to point to *evidence* within the prior art references themselves as to why persons of ordinary skill in the art would have been motivated to

as explained in Mr. Nishimura's Declaration of November 8, 2001 and obtain unexpected results of improved cover factor of a woven cloth prepreg incorporating a line-like binder as compared to a woven cloth prepreg without a line-like binder. The obviousness rejection should be withdrawn in light of the well-established law that the solution to a problem, once known, is often obvious even when the recognition of the problem itself or of the source of the problem is not. *Eibel Process Co. v. Minnesota and Ontario Paper Co.*, 261 U.S. 45 (1923), established the rule that the discovery of the source of a problem may result in a patentable invention despite the fact that the solution would have been obvious once the source of the problem was discovered. The court in *In re Nomiya*, 184 USPQ 607, 612 (CCPA 1975), stated:

It should not be necessary for this court to point out that a patentable invention may lie in the discovery of the source of a problem even though the remedy may be obvious once the source of the problem is identified. This is part of the "subject matter as a whole" which should always be considered in determining the obviousness of an invention under 35 U.S.C. 103.

Even assuming that the Examiner has established a *prima facie* case of obviousness, which Appellants deny, the obviousness rejection over Kishi in view of Homma should be withdrawn because of the unexpected results produced by this invention as shown in Mr. Nishimura's Declaration of May 12, 2000. See *In re Dillon*, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), *cert. denied*, 500 U.S. 904 (1991)).

As explained above, the Appellants were the first to recognize the problem of the low cover factor of a woven cloth of a thick yarn, such as a 12K yarn, when it was subjected to a wet process and the solution shows unexpected results. See Mr. Nishimura's Declaration of May 12, 2000. "Objective evidence such as commercial success, failure of others, long-felt need, and unexpected results must be considered before a conclusion of obviousness is reached."

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combine the disclosures so as to arrive at the claimed invention. Applicant's position rests on the Examiner's failure to produce and rely on objective evidence of motivation in the prior art itself.

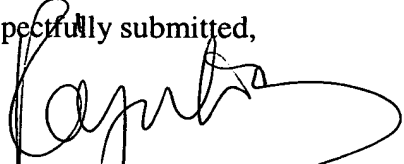
*Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1380 (Fed. Cir. 1986) (citations omitted), *cert. denied*, 480 U.S. 947, 94 L. Ed. 2d 792, 107 S. Ct. 1606 (1987). Appellants respectfully submit that “[c]onsistent with the rule that all evidence of nonobviousness *must* be considered when assessing patentability, the PTO *must* consider comparative data in the specification in determining whether the claimed invention provides unexpected results.” *In re Soni*, 34 USPQ 2d 1684, 1687-88 (Fed. Cir. 1995) (emphasis added).

## CONCLUSIONS

For the foregoing reasons, Appellants submit that the obviousness rejection should be withdrawn.

In the event that the transmittal letter is separated from this document and the Patent & Trademark Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952**, referencing 360842003400.

Date: September 16, 2003

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## APPENDIX 1

22. A cloth prepreg made by a wet process comprising (i) a reinforcing fiber-containing woven fabric impregnated with a resin, (ii) a binder distributed in a line-like manner to maintain yarn flatness and (iii) a sizing agent on the reinforcing fiber,

the fabric comprising a number of crossing points of warp and weft in a range of from 2,000 to 70,000/m<sup>2</sup>, said warp and said weft being substantially free from twist, a width of 3 to 20 mm and a flatness as defined by a ratio of yarn width to yarn thickness of at least 20, and

the prepreg having a cover factor of at least 90%, wherein the cloth fabric is a single woven fabric.

23. A cloth prepreg according to claim 22, wherein the number of crossing points of warp and weft is in a range of from 2,500 to 25,000/m<sup>2</sup>.

24. A cloth prepreg according to claim 22, wherein the prepreg has a cover factor of at least 97%.

25. A cloth prepreg according to claim 22, wherein the number of the filaments of each of the warp and weft yarn is 6,000 or more, the respective woven densities of the warp and weft are substantially the same and the fabric is woven from carbon fiber so as to provide a carbon fiber weight of the woven fabric within the range of 140 to 240g/m<sup>2</sup>.

26. A cloth prepreg according to claim 22, wherein the average area of the openings between the warp and weft is 1.5 mm<sup>2</sup> or less.

27. A cloth prepreg according to claim 26, wherein the openings between the warp and weft are substantially closed.

28. A cloth prepreg according to claim 22, wherein the resin is a thermosetting phenol resin.

43. The cloth prepreg of claim 22, wherein the binder is disposed along the length of the fiber.

44. The cloth prepreg of claim 22, wherein the binder is on the fabric.